WHAT IS CLAIMED IS:

1. A shell and tube reactor module for hydrogen production, comprising:

a reactor having a shell side, at least one palladium membrane tube as a tubular section, and a steam reforming catalyst in said shell side,

wherein said at least one palladium membrane tube has one sealed end located at upstream of flowing path.

2. The shell and tube reactor module according to claim 1, wherein said palladium membrane tube is formed by mounting a palladium membrane on a porous support, wherein said palladium membrane is made of one selected from a group consisting of palladium, a palladium-silver alloy and a palladium-copper alloy.

3. The shell and tube reactor module according to claim 2 wherein said porous support is made of stainless steel.

4. The shell and tube reactor module according to claim 1, wherein a length of said at least one tube is between 3 cm and 120 cm.

5 .The shell and tube reactor module according to claim 1, wherein said reactor is fed with steam and a fuel for said hydrogen production, wherein hydrogen permeates through said palladium membrane to yield over 99% purity of hydrogen.

6. The shell and tube reactor module according to claim 5, wherein said fuel is selected from a group consisting of ethanol, methanol, isopropanol, hexane, gasoline, methane and a mixture thereof.

7. The shell and tube reactor module according to claim 1, wherein said steam reforming catalyst is one of $CuOZnOAl_2O_3$, $PdOCuOZnOAl_2O_3$ and $K_2O,NiO/\gamma-Al_2O_3$.

8. The shell and tube reactor module according to claim 1, further

comprising a catalytic combustion section having a noble metal catalyst dispersed on a supporting material for heating said reactor.

9. The shell and tube reactor module according to claim 8, wherein said catalytic combustion section is made of a stainless steel.

10. The shell and tube reactor module according to claim 8, wherein said noble metal is selected from a group consisting of platinum (Pt), palladium (Pd), rhodium (Rh), Ruthenium (Ru) and a mixture thereof.

11. The shell and tube reactor module according to claim 8, wherein said supporting material is one selected from a group consisting of γ-alumina, titania, zirconia, silica, DASH220 (NE Chemtec, Inc. Japan) and N220 (Süd Chemie Catalysts, Japan, Inc.).

12. The shell and tube reactor module according to claim 1, further comprising a reservoir containing fuels without H_2O provided for starting up heating.

13. An assembly of shell and tube reactor modules for hydrogen production, comprising a reactor splitting into two reactor sections and having a common shell, wherein each of said reactor sections has at least one palladium membrane tube as a tubular section, a steam reforming catalyst,

wherein said at least one palladium membrane tube has one sealed end located at upstream of flowing path.

14. The assembly of shell and tube reactor modules according to claim 13, wherein said palladium membrane tube is formed by mounting a palladium membrane on a porous support.

15. The assembly of shell and tube reactor modules according to claim 14, wherein said porous support is made of stainless steel.

16. The assembly of shell and tube reactor modules according to claim 13,

wherein a length of said at least one tube is between 3 cm and 60 cm.

17. The assembly of shell and tube reactor modules according to claim 13, wherein said reactor is fed with steam and a fuel for said hydrogen production, wherein hydrogen permeates through said palladium membrane to yield over 99% purity of hydrogen.

18. The assembly of shell and tube reactor modules according to claim 17, wherein said fuel is selected from a group consisting of ethanol, methanol, isopropanol, hexane, gasoline, methane and a mixture thereof.

19. The assembly of shell and tube reactor modules according to claim 13, wherein said steam reforming catalyst is one of $CuOZnOAl_2O_3$, $PdOCuOZnOAl_2O_3$ and $K_2O,NiO/\gamma-Al_2O_3$.

20. The assembly of shell and tube reactor modules according to claim 13, further comprising a catalytic combustion section having a noble metal catalyst dispersed on a supporting material to heat said reactors.

21. The assembly of shell and tube reactor modules according to claim 20, wherein said catalytic combustion section is formed of stainless steel.

22. The assembly of shell and tube reactor modules according to claim 20, wherein said noble metal is selected from a group consisting of platinum (Pt), palladium (Pd), rhodium (Rh), Ruthenium (Ru) and a mixture thereof.

23. The assembly of shell and tube reactor modules according to claim 20, wherein said supporting material is one selected from a group consisting of γ-alumina, titania, zirconia, silica, DASH220 (NE Chemtec, Inc. Japan) and N220 (Süd Chemie Catalysts, Japan, Inc.).

24. A process of hydrogen production with an integrated catalytic oxidation for heating, comprising steps of:

feeding a feed into a shell and tube reactor module comprising a reactor

having a shell side, at least one palladium membrane tube as a tubular section, and a steam reforming catalyst in said shell side, wherein said at least one palladium membrane tube has one sealed end located at upstream of flowing path; and

catalyzing a steam reforming reaction of said feed for producing said hydrogen; and

catalyzing an oxidation by a fuel of alcohol or hydrocarbons then by spent products from said steam reforming reaction or/and said feed for producing thermal energy to heat up said reactor and to maintain the reaction temperature steady.

25. The process according to claim 24, wherein said palladium membrane tube is formed by mounting a palladium membrane on a porous support, wherein said palladium membrane is made of one selected from a group consisting of palladium, a palladium-silver alloy and a palladium-copper alloy.

26. The process according to claim 25 wherein said palladium-silver alloy has a ratio of palladium to silver between 1 and 1.5.

27. The process according to claim 25 wherein said palladium-copper alloy has a ratio of palladium to copper between 7/3 and 11/9.

28. The process according to claim 24, wherein a length of said at least one tube is between 3 cm and 120 cm.

29. The process according to claim 24, wherein said fuel is selected from a group consisting of ethanol, methanol, isopropanol, hexane, gasoline, methane and a mixture thereof.

30. The process according to claim 24, wherein said steam reforming catalyst is one of $CuOZnOAl_2O_3$, $PdOCuOZnOAl_2O_3$ and $K_2O,NiO/\gamma-Al_2O_3$.

31. The process according to claim 24, further comprising a catalytic

combustion section located in said shell and tube reactor module and having a noble metal catalyst dispersed on a supporting material to heat said reactor.

32. The process according to claim 31, wherein said catalytic combustion section is formed of stainless steel tubes.

33. The process according to claim 31, wherein said noble metal is selected from a group consisting of platinum (Pt), palladium (Pd), rhodium (Rh), Ruthenium (Ru) and a mixture thereof.

34. The process according to claim 31, wherein said supporting material is one selected from a group consisting of γ-alumina, titania, zirconia, silica, DASH220 (NE Chemtec, Inc. Japan) and N220 (Süd Chemie Catalysts, Japan, Inc.).